Sept. 24, 1935. E. P. SEARING 2,015,196

CONSTANT SPEED WINDER

Filed April 12, 1934

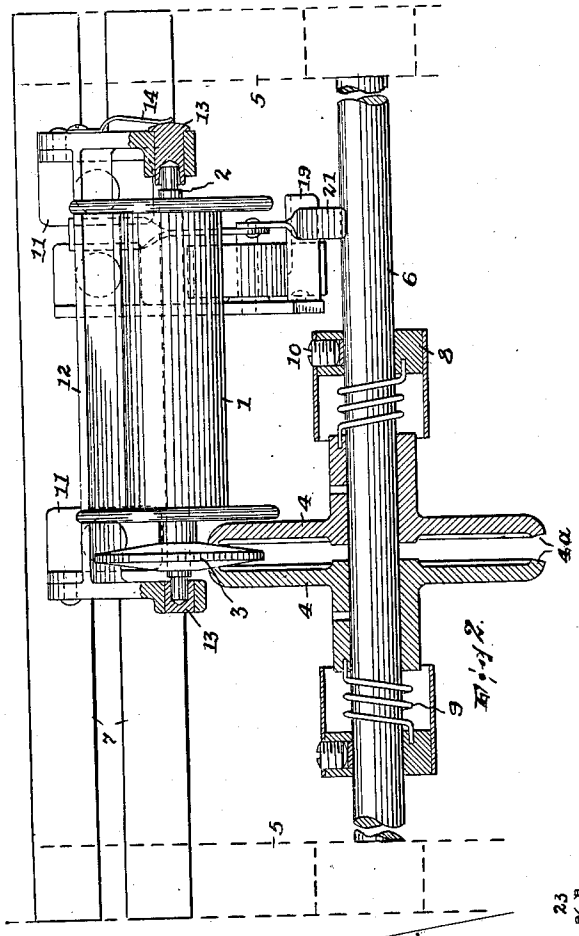


Fig. 2.

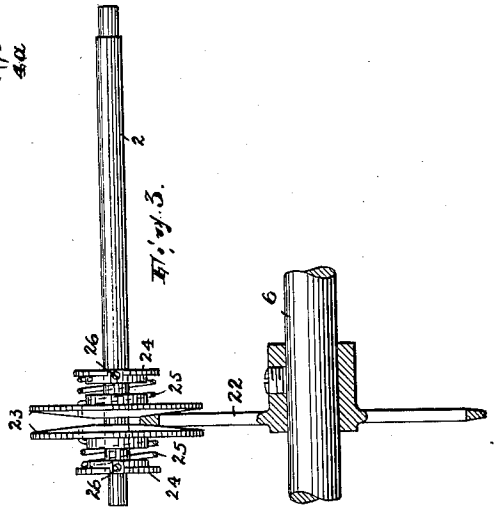


Fig. 3.

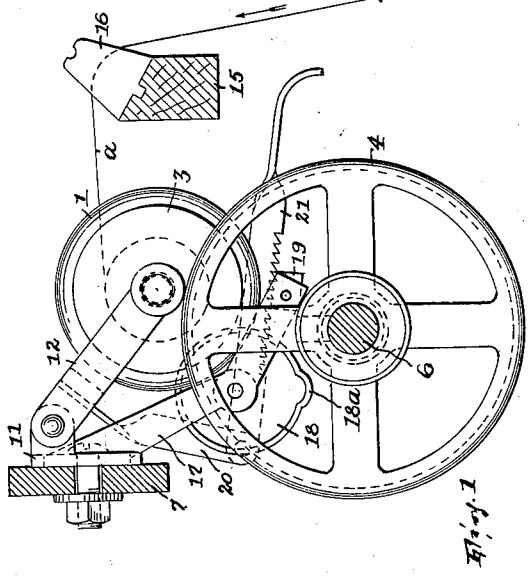


Fig. 1.

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CONSTANT SPEED WINDER

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7 Claims. (Cl. 242—18)

This invention relates to mechanisms for winding yarn and other material.

According to the invention, given a rotary driving element and a rotary driven element on which to form the wound mass each rotatable around an axis penetrating the same, the driven element is movable transversely of its axis relatively to, and has an end face in contact with, the driving element. Hence it is possible to vary the speed of the driven element relatively to that of the driving element, to wit, by moving the driven element transversely of its axis.

So much being assumed, my invention contemplates that the driven element be normally urged in the direction in which its axis approaches the driving element and the inclusion in the mechanism of means, actuated by the growing mass, to move the driven element in the opposite direction; and, further, the inclusion of means thereupon to retain the driven element in the position to which it is so moved whereby the following result will ensue:

In an ordinary machine for winding bobbins, spools and the like the driving element engages a whirl or the like fast on the spindle portion of the core-element including the bobbin, etc. Assuming the axial speed of the driving element and core-element to be constant the peripheral speed of the wound mass increases as said mass increases in diameter. Hence the maximum speed safely possible so far as the yarn is concerned is only at the last; besides, the tension and degree of stretch of the yarn during the winding vary as does the compactness of the mass, being greatest at the last. But according to my invention it is possible to preserve the peripheral speed of the mass substantially constant from start to finish of the winding, with consequent constancy of tension, stretch and compactness of winding, not to mention a substantial increase in output.

I have illustrated the invention herein in reference to a yarn winding machine, the drawing showing,

In Fig. 1 a side elevation of a winding unit constructed in accordance with the invention, certain parts appearing in section;

In Fig. 2 a front elevation of such unit, certain parts also appearing in section; and

In Fig. 3 a front elevation, partly in section, of a modified form of the driving and driven elements.

The driven element here comprises the spool 1 and the spindle 2 onto which the spool is slipped and which it snugly fits and which has a whirl 3 fast thereon. An end face of said element may be taken as either side of the whirl which, according to the example shown is preferably formed with a bevel at each such face, or so that the whirl tapers toward its periphery. (The term "end face" wherever used herein with reference to either the driven or driving element means a circumferential face facing lengthwise of the axis, or generally so, of such element.)

The driving element may be taken as either or both of a pair of rotary disks 4 which in this example receive the whirl between them and respectively contact with its said faces, the disks 4 desirably having adjoining circumferential flanges 4a which have the actual contact with said faces and are beveled at the same angle as they are.

The driving element is rotative around a fixed axis whereas the driven element is journaled so as to be movable transversely of its axis, or in a path in which the contact between its end face and the driver may be at different points from the periphery of the driven element; in the example, as will appear, this contact is between an end face of the driver as well as an end face of the driven element, the two elements having their axes parallel.

Supporting structure for said elements is afforded as follows: In uprights 5 is arranged a horizontal shaft 6 and carried by the uprights is a pair of horizontal bars 7 parallel with the shaft. The driver is centrally penetrated by the shaft which is equipped with means normally to hold the driver against the corresponding end face of the whirl of the driven element and here comprising a cupped collar 8 and a spring 9 interposed between the collar and corresponding driver and housed in the former, said collar being movable along the shaft to vary the tension of the spring and when so moved being adapted to be held to the shaft by a set-screw 10. In the present example the shaft is a rotative part of the supporting structure and itself acts to drive each driver through the corresponding spring which for that purpose has its ends engaged in holes in the driver and whirl. On the bars 7 is fixed a pair of brackets 11 in which is pivoted on a horizontal axis a two-armed carrier 12 in which the horizontal spindle of the driven element is also journaled; the bearings for the spindle are thrust-bearings 13, one of which is fixed in the carrier and the other retractive against a spring 14 so that the driven element may be removed for doffing and replaced. By moving the driven element relatively to the driver to

shift the point of contact as explained it is possible to vary the peripheral speed of the driven element. In the present example the driven element is arranged above the driving element (with its axis horizontal) and tends to fall by gravity toward the same, or in the direction to shift the said contact away from the periphery of the driven element. An object of the invention being to cause reduction of the peripheral speed of the driven element automatically as the winding of the yarn or other material thereon progresses, means is provided for moving the driven element contrary to the direction in which it is thus normally urged and also for holding it in the position to which it is thus moved, the first of these means being actuated by the mass of windings on the driven element which in the present example (where yarn *a* is wound) are laid on the spool of the driven element in layers by traversing the yarn lengthwise of the spool axis in the usual way, as by a suitably reciprocated yarn-guide rail **15** having a yarn guide **16**. Thus:

In an arm **17** depending from the bars **7** is journaled a cam **18** whose axis is parallel with those of the driving and driven elements and which is here an eccentric opposed to the spool barrel and hence the windings formed thereon, so that when the diameter of the wound mass increases sufficiently the cam will be wiped thereby and rotated, moving the driven element away from the driver or in the direction to shift the mentioned contact between the two elements toward the periphery of the driven element and so reduce the peripheral speed of the latter. Said arm is extended forward (to the right in Fig. 1) and has a lateral blade **19** with an upper sharp edge and forming a detent.

The carrier **12** has a depending arm **20** (thus giving the carrier the character of a lever) and to this is freely pivoted the forwardly projecting ratchet-bar **21** which rests on the detent by gravity and has its under side saw-toothed, the abrupt sides of the teeth facing rearwardly. Any other clutching device than a ratchet bar having a prolonged clutching portion to be engaged by the detent will respond.

At the start of the winding the barrel of the spool will be clear of the cam, being held in that position by the detent engaging the ratchet-bar at one of the teeth thereof near the right in Fig. 1. As the winding proceeds and the wound mass increases in diameter the periphery of the mass will wipe the cam and rotate it, so that the cam will lift the driven element and its carrier, the latter being then held in its new position (with the wound mass now again clear of the cam) by the engagement of the detent with another tooth of the ratchet-bar which, as the carrier was lifted, moved somewhat forward. This operation will be repeated intermittently as the mass continues to increase in diameter. In consequence the peripheral speed of the wound mass will remain constant from start to finish of the winding, so that there may be a substantial gain in production and the condition of the yarn as to tension and stretch or distension and the compactness of the mass will remain substantially constant throughout the winding.

In Fig. 3 there is a single driving element **22** fixed on the shaft **6** and two whirls **23** on the spindle **2**, the whirls being between two collars **24** movable along the shaft toward or from each other to vary the tension of the springs **25** interposed between them and the whirls and being secured to the shaft when so moved by the set-screws **26**.

The reason for the bevelling in either example shown is obviously to obtain an efficient driving contact, not possible if the faces of the two elements were planes perpendicular to their axes.

Since the bevels of the whirl are a factor in retaining the driven element in its new position when lifted the parts **19**—**21** are not indispensable.

I do not wish to be limited to any detail hereinbefore set forth and not specified in the appended claims.

Having thus fully described my invention what I claim is:

1. Winding mechanism comprising a rotary driving element and a rotary driven element on which to form the wound mass each of which elements is rotatable around an axis penetrating such element and the driving element having contact with an end face of the driven element, one element being movable to vary the distance between the axis of the driven element and the driving element, means, actuated by the growing wound mass, to move the movable element, means to retain the movable element when so moved in the position to which it is moved, and supporting structure for said elements and means.

2. Winding mechanism comprising a rotary driving element and a rotary driven element on which to form the wound mass each of which elements is rotatable around an axis penetrating such element and the driving element having contact with an end face of the driven element, one element being normally urged in a direction to vary the distance between the axis of the driven element and the driving element, means actuated by the growing wound mass, to move in the opposite direction the movable element, and means to retain the movable element in the position to which it is moved, and supporting structure for said elements and means.

3. Winding mechanism comprising a rotary driving element and a rotary driven element on which to form the wound mass each of which elements is rotatable around an axis penetrating such element and the driving element having contact with an end face of the driven element, one element being normally urged in a direction to vary the distance between the axis of the driven element and the driving element, means actuated by the growing wound mass, to move in the opposite direction the movable element, a clutch-device connected with the movable element to move therewith and having a clutching portion, and supporting structure for said elements and means having means engaged by said clutching portion to hold the clutch-device in the position to which it is moved.

4. Winding mechanism comprising a rotary driving element and a rotary driven element on which to form the wound mass each rotatable around an axis penetrating such element and one element being movable transversely of its axis relatively to, and having an end face in contact with, the other element and being normally urged in the direction in which its axis approaches the latter element, means, actuated by the growing wound mass, to move in the opposite direction the element which is so movable, means thereupon to retain the element so moved in the position to which it is moved, and supporting structure for said elements and means.

5. Winding mechanism comprising a rotary driving element and a rotary driven element on which to form the wound mass each rotatable

around an axis penetrating such element and one element being movable transversely of its axis relatively to, and having an end face in contact with, the other element and being normally urged in the direction in which its axis approaches the latter element, means, actuated by the growing wound mass, to move in the opposite direction the element which is so movable, a clutch-device connected with the element so moved to move therewith and having a clutching portion, and supporting structure for said element and means having means engaged by said clutching portion to hold the same in the position to which it is so moved.

6. Winding mechanism comprising a rotary driving element and a rotary driven element on which to form the wound mass each rotatable around an axis penetrating such element and one being movable to vary but normally urged to reduce the distance between the driving element and the axis of the driven element and the driving element having contact with the end face of the driven element, means, actuated by the growing wound mass, to move the movable element in the direction contrary to that in which it is so urged, and supporting structure for said elements and means.

7. Winding mechanism comprising a rotary driving element and a rotary driven element on which to form the wound mass each rotatable around an axis penetrating such element and one being movable to vary but normally urged to reduce the distance between the driving element and the axis of the driven element and the one element having contact with the end face of the other element, means, actuated by the growing wound mass, to move the movable element which is so movable in the direction contrary to that in which it is so urged, means thereupon to retain the movable element in the position to which it is thus moved, and supporting structure for said elements and means.

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